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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/189,098	11/09/1998	ALAN R. REINBERG	3528US-(97-1	5116
7590	12/17/2003		EXAMINER	
TRASK BRITT & ROSSA P O BOX 2550 SALT LAKE CITY, UT 84110			WEISS, HOWARD	
			ART UNIT	PAPER NUMBER
			2814	

DATE MAILED: 12/17/2003

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Paper No. 1203

Application Number: 09/189,098

Filing Date: November 09, 1998

Appellant(s): REINBERG, ALAN R.

Brick G. Power
(Reg. No. 38,581)
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 29 July 2003.

(1) *Real Party in Interest*

A statement identifying the real party in interest is contained in the brief.

(2) *Related Appeals and Interferences*

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) *Status of Claims*

The statement of the status of the claims contained in the brief is correct.

(4) *Status of Amendments After Final*

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) *Summary of Invention*

The summary of invention contained in the brief is correct.

(6) *Issues*

The appellant's statement of the issues in the brief is correct.

(7) *Grouping of Claims*

Appellant's brief includes a statement that claims 1 to 20 and 32 to 71 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

(8) *ClaimsAppealed*

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,792,594	Brown et al.	7-1998
4,770,977	Buiguez et al.	9-1988
5,296,716	Ovshinsky et al.	3-1994
5,451,881	Whitten et al.	9-1995

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:
 - (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
2. Initially, and with respect to Claims 32 to 38, 70 and 71, note that a "product by process" claim is directed to the product *per se*, no matter how actually made. See In re Thorpe et al., 227 USPQ 964 (CAFC, 1985) and the related case law cited therein which make it clear that it is the final product *per se* which must be determined in a "product by process" claim, and not the patentability of the process, and that, as here, an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. As stated in Thorpe,

even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. *In re Brown*, 459 F.2d 531, 535, 173 USPQ 685, 688 (CCPA 1972); *In re Pilkington*, 411 F.2d 1345, 1348, 162 USPQ 145, 147 (CCPA 1969); *Buono v. Yankee Maid Dress Corp.*, 77 F.2d 274, 279, 26 USPQ 57, 61 (2d. Cir. 1935).

Note that Applicant has burden of proof in such cases as the above case law makes clear.

3. Claims 1 to 6, 8 to 10, 32 to 38, 68 and 70 are rejected under 35 U.S.C. § 103(a) as obvious over Brown et al. (U.S. Patent No. 5,792,594) and Buiguez et al. (U.S. Patent No. 4,770,977).

Brown et al. show most aspects of the instant invention (e.g. Figure 4 and Column 8 Lines 3 to 47) including:

- an intermediate conductive layer **22** made of a refractory metal (nickel and palladium; Column 6 Lines 39 and 40) in electrical and physical contact with a structure **12** of a semiconductor device, said structure located at a lower level than a protective, dielectric layer **14,18**
- an electrically conductive contact layer **26** in electrical contact with said intermediate conductive layer
- an electrical and thermal insulator component **14a, 34** made of resin and enveloped and sandwiched between said intermediate conductive and electrically conductive contact layers
- said intermediate conductive layer and the contact layer abutting said protective, dielectric layer

Brown et al. specify that the protective, dielectric layers be photosensitive resin (i.e. polymers) but does not explicitly state that these layers contain silicon. Buiguez et al. teach to use silicon-containing, photosensitive polymers because it makes it easy and cost effect to perform (Column 2 Lines 47 to 63). It would have been obvious to a person of ordinary skill in the art at the time of invention to use silicon-containing, photosensitive polymers as taught by Buiguez et al. in the device of Brown et al. because it makes it easy and cost effect to perform.

As to the grounds of rejection under "product by process", how the contact is made does not affect the final device structure. See MPEP § 2113 which discusses the handling of "product by process" claims.

The Specification contains no disclosure of either the critical nature of the claimed arrangement or any unexpected results arising therefrom (the Specification only mentions preferred values). Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990). Since the Applicant has not established the criticality of the thicknesses of the intermediate conductive layer and the contact layer and since these thicknesses are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use these values for the stated layers in the device of Brown et al.

4. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brown et al. and Buiguez et al., as applied to Claim 1 above, and in further view of Whitten et al. (U.S. Patent No. 5,451,811)

Brown et al. and Buiguez et al. disclose the claimed invention (Paragraph 3) except that the contact layer comprises copper instead of at least one of a refractory metal, a refractory metal nitride and aluminum. Whitten et al. teach (Column 4 Lines 55 to 57) that refractory metals (i.e. titanium-tungsten and molybdenum) are equivalent conductive materials known in the art. Therefore, because these conductors were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute refractory metals for copper.

5. Claims 7, 12 to 19, 39 to 54, 56 to 66, 69 and 71 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. (U.S. Patent No. 5,296,716) in view of Brown et al. and Buiguez et al.

Ovshinsky et al. show most aspects of the instant invention (e.g. Figure 1) including a phase change memory element **30** located beneath the surface of an electrode **42** bearing, silicon oxide-containing layer **44**. Ovshinsky et al. does not show a contact

for the memory element as claimed including the intermediate conductive layer, the contact layer and the insulator component enveloped by said layers. Brown et al. teach (Paragraph 3 above) to use a contact structure as claimed adjacent to the memory element (pad **12** of Brown et al. would be pad **40** of Ovshinsky et al.) to reduce costs, promote high throughput and shorten cycle times (Column 2 Lines 58 to 60). It would have been obvious to a person of ordinary skill in the art at the time of invention to use the contact structure as taught by Brown et al. in the device of Ovshinsky et al. to reduce costs, promote high throughput and shorten cycle times.

Brown et al. specify that the protective, dielectric layers be photosensitive resin (i.e. polymers) but does not explicitly state that these layers contain silicon. Buiguez et al. teach to use silicon-containing, photosensitive polymers because it makes it easy and cost effect to perform (Column 2 Lines 47 to 63). It would have been obvious to a person of ordinary skill in the art at the time of invention to use silicon-containing, photosensitive polymers as taught by Buiguez et al. in the device of Ovshinsky et al. and Brown et al. because it makes it easy and cost effect to perform.

6. Claims 20, 55 and 67 rejected under 35 U.S.C. 103(a) as being unpatentable over Ovshinsky et al. in view of Brown et al. and Buiguez et al., as applied to Claims 12, 45 and 56 above, and in further view of Whitten et al.

Ovshinsky et al. in view of Brown et al. and Buiguez et al. disclose the claimed invention (Paragraph 5) except that the contact layer comprises copper instead of an at least one of a refractory metal, a refractory metal nitride and aluminum. Whitten et al. teach (Column 4 Lines 55 to 57) that refractory metals (i.e. titanium-tungsten and molybdenum) are equivalent conductive materials known in the art. Therefore, because these conductors were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute refractory metals for copper.

(11) Response to Argument

The Appellants argue that there is no motivation to use the silicon-containing photosensitive polymer of Buiguez et al. in the device of Brown et al. since the only purpose for given for using said polymer is as a photomask. However, the protective dielectrics in Brown et al. (i.e. **14/18** in Figure 4) are described as "photodefinable resin" (Column 5 Line 8 and Column 6 Line 7). Therefore the motivation to use the photodefinable silicon-containing resin (i.e. polymer) of Buiguez et al. is as stated in the rejection: it makes it easy and cost effect to perform (Buiguez et al.: Column 2 Lines 47 to 63).

In reference to the level of the structure, the structure **12** is at a level below the protective, silicon-containing dielectrics **14/18** (when combined with the photodefinable polymer of Buiguez et al.) as stated in the rejection above. Dielectric layer **11** is not mentioned as this dielectric in the Examiner's rejection.

In reference to the possible blistering and delaminating of the copper from the silicon-containing layers, it is true this problem is known in the art. However, there are many ways, also well known in the art, available to one of ordinary skill to prevent any of the detrimental effects described by the Appellants. In fact, there are a number of subclasses (e.g. 438/628, 654) in the patent system devoted to patents promoting adhesion of dielectric and metal layers. One of ordinary skill in the art would have the means to prevent any adverse effects between the copper and the silicon-containing dielectrics of the device of Brown et al. and Buiguez et al. Additionally, the adverse effects of silicon-containing material and copper are based upon the materials such as silicon oxide and

silicon nitride, both rich in silicon. In contrast, the silicon-containing polymer of Buiguez et al. has a single atom of silicon (see Column 3 Lines 1 to 15) in a rather large polymer molecule. The Appellants have not shown that the same adverse effects would happen with the use of this polymer.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

In reference to the limitation of Claim 10, the express, implicit, and inherent disclosures of a prior art reference may be relied upon in the rejection of claims under 35 U.S.C. 102 or 103. "The inherent teaching of prior art reference, a question of fact, arises both in the context of anticipation and obviousness." *In re Napier*, 55 F.3d 610, 613, 34 USPQ2d 1782, 1784 (Fed. Cir. 1995) (affirmed a 35 U.S.C. 103 rejection based in part on inherent disclosure in one of the references). See also *In re Grasselli*, 713 F.2d 731, 739, 218 USPQ 769, 775 (Fed. Cir. 1983). In the instant case, the melting point of the conductive materials in the prior art are well above any temperature required to switch a phase change component (e.g. Al has a melting temperature of 933

$^{\circ}\text{K}$ and Cu is 1356 $^{\circ}\text{K}$). Also, the thermal insulative properties of the materials used by the prior art are an inherent property of those materials.

In reference to the layers' abutment, the intermediate conductive layer **22** and the contact layer **26** in Brown et al. abut the protective layer **14/18**.

In reference to use of Whitten et al., the Examiner notes that Whitten et al. was used to show the equivalence of the metal conductors copper and at least one of a refractory metal, a refractory metal nitride and aluminum.

In response to applicant's argument that there is no suggestion to combine the references Ovshinsky et al. in view of Brown et al. and Buiguez et al., the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Brown et al. teach to use the redistribution of input/output of semiconductor devices (e.g. Figure 2E) to reduce costs, promote high throughput and shorten cycle times (Column 2 Lines 58 to 60). These reasons are important to the memory device of Ovshinsky et al. as well (Column 5 Lines 14 to 20). Brown et al. state that their invention could be adapted to other applications by one of ordinary skill in the art (Column 8 Lines 37 to 47). Therefore, it is not unreasonable to assume one of ordinary skill in the art would adapt the device of Brown et al. with invention of Ovshinsky et al. to produce the instant invention as claimed.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Howard Weiss
Examiner
Art Unit 2814

HW/hw
December 10, 2003

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